

## REMARKS

Favorable reconsideration of this application in view of the foregoing amendments and remarks to follow is respectfully requested. Since the present amendment raises no new issues, and in any event, places the application in better condition for consideration on appeal, entry thereof is respectfully requested.

Before addressing the specific grounds of rejection raised in the outstanding Office Action, applicants have amended Claims 1, 10, and 17 in the manner indicated supra.

Applicants observe that each independent claim was amended to positively recite that the Re metal gate *vertically abuts* the gate dielectric. Support for this amendment to Claims 1, 10 and 17 is found throughout the originally filed application. Attention is particularly made to paragraph 0035 of the corresponding published application wherein it states, "The Re electrode ... comprises the steps of (a) depositing a uniform layer of Re directly onto a dielectric material such as an ultra-thin gate dielectric material, ...". Applicants observe that this amendment should be entered since it merely restates the language in the previous listing of claims of the position of the Re electrode relative to the gate dielectric.

In addition to the above amendment to Claims 1, 10 and 17, applicants have further amended those claims to positively recite that the *Re is derived from a  $Re_2(CO)_{16}$  CVD precursor*. Support for this amendment to the claims is also found throughout the originally filed application. Attention is made to paragraphs 0012, 0035, 0036, 0040, and 0043.

Since the above amendments to the claims do not introduce new matter into the specification of the instant application, entry thereof is respectfully requested.

Claims 1, 2, 4, 7-11 and 14-16 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over U.S. Patent No. 6,476,545 to Suguro ("Suguro"), in view of U.S. Patent No.

6,300,208 to Talwar et al. ("Talwar et al.") and U.S. Patent No. 6,248,673 to Huang ("Huang"). Claims 1, 2, 4, 7-11 and 14-16 also stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures of U.S. Patent Application Publication No. 2003/0011080 to Deshpande et al. ("Deshpande et al."), Talwar et al. and Huang. Claims 1, 2, 4, 7-11 and 14-16 further stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over the combined disclosures of U.S. Patent No. 6,614,079 to Lee et al. ("Lee et al."), Talwar et al. and Huang.

With respect to the rejection citing the combined disclosures of Suguro, Talwar et al. and Huang, applicants respectfully submit that none of the applied references teaches or suggests the claimed structures recited in Claims 1, 10 and 17. Specifically, the combined disclosures of Suguro, Talwar et al., and Huang do not teach or suggest a semiconductor structure including, among the other recited elements, *a gate formed of a metal comprising Re vertically abutting said Hf-based gate dielectric, said gate comprising Re has an interface trapped charge density of about  $3E 10\text{ cm}^{-2}\text{ eV}^{-1}$  to about  $4E 10\text{ cm}^{-2}\text{ eV}^{-1}$ , and wherein said Re is derived from a  $\text{Re}_2(\text{CO})_{10}$  CVD precursor.*

The primary reference, i.e., Suguro, spurring the first obviousness rejection is defective in that the applied reference does not teach or suggest a semiconductor structure including *a gate formed of a metal comprising Re vertically abutting said Hf-based gate dielectric, said gate comprising Re has an interface trapped charge density of about  $3E 10\text{ cm}^{-2}\text{ eV}^{-1}$  to about  $4E 10\text{ cm}^{-2}\text{ eV}^{-1}$ , and wherein said Re is derived from a  $\text{Re}_2(\text{CO})_{10}$  CVD precursor.* In contrast, Suguro discloses a structure in which a diffusion barrier is present between the metal gate and the gate dielectric. Moreover, the applied reference does not teach or suggest a Re gate, let alone a Re gate that is derived from a  $\text{Re}_2(\text{CO})_{10}$  CVD precursor. In Suguro, the gate electrode includes one

of W, Mo, Ru, Ag and Cu. Applicants find no teaching or suggestion of a Re metal or removing the diffusion barrier layer between the gate electrode and the gate dielectric in the disclosure of Suguro.

Applicants respectfully submit that the combination of Talwar et al. and Huang does not obviate the above defects in Suguro since none of the applied secondary references teaches or suggests applicants' claimed structures. Specifically, the combination of Talwar et al. and Huang does not teach or suggest a semiconductor structure including *a gate formed of a metal comprising Re vertically abutting said Hf-based gate dielectric, said gate comprising Re has an interface trapped charge density of about  $3 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$  to about  $4 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$ , and wherein said Re is derived from a  $\text{Re}_2(\text{CO})_{10}$  CVD precursor.* Applicants observe that although Talwar et al. discloses Re as a possible candidate for a gate metal, it provides no indication whether a  $\text{Re}_2(\text{CO})_{10}$  CVD precursor was used or not. See, for example, col. 5, lines 46-56. Huang discloses a structure in which metal gates may also be used. See, for example, col. 6, lines 20-33. Despite this apparent disclosure of utilizing a metal gate as a possible candidate, applicants find no disclosure utilizing a  $\text{Re}_2(\text{CO})_{10}$  CVD precursor to form a Re gate electrode.

In view of the above, the combined disclosures of Suguro (which requires a diffusion barrier layer between the metal gate and the gate electrode), Talwar et al. and Huang do not render the claimed structures obvious.

With respect to the second obviousness rejection that cites Deshpande et al. as the principal reference and the third obviousness rejection which cites Lee et al. as the principal reference, applicants submit the following remarks thereon.

Insofar as the § 103 rejections citing Deshpande et al. and Lee et al. are concerned, applicants submit that the statute under 35 U.S.C. § 103(c) states that:

Subject matter developed by another person, which qualifies as prior art only under one or more subsections (e), (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Applicants submit that the Deshpande et al. and the Lee et al. references were applied by the Examiner as prior art under 35 U.S.C. § 103 via 35 U.S.C. § 102(e). Applicants note in this regard that MPEP § 706.02(k) states that:

Effective November 29, 1999, subject matter which was prior art under former 35 U.S.C. § 103 via 35 U.S.C. § 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

This change to 35 U.S.C. § 103 is applicable to all utility, design, and plant applications filed on or after November 29, 1999 including continued prosecution applications (CPA) filed under 37 C.F.R. § 1.53(d). Applicants note that the present application was filed as a RCE application as late as August 2, 2006; therefore the present application is entitled to the above change in 35 U.S.C. § 103.

In view of this, and the fact the present application, Deshpande et al. and Lee et al. "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person", the Deshpande et al. and the Lee et al. references are disqualified as a reference under 35 U.S.C. § 103(c).

To evidence that the instant application, Deshpande et al. and Lee et al. "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person", the assignment document of the present application (recordation date

November 29, 2001 at Reel 012332, Frame 0260) was compared with the recorded assignment of Deshpande et al. (recording date July 11, 2001 at Reel 012007, Frame 0734) as well as with the recorded assignment document of Lee et al. (recording date July 19, 2001, reel 012026, Frame 0527). In all instances, the inventors conveyed their entire interest to International Business Machines Corporation; therefore establishing common ownership between the instant application, Deshpande et al. and Lee et al.

In view of the above information, both Deshpande et al. and Lee et al. are disqualified as art therefore the second and third obviousness rejections are based solely on the combined disclosures of Talwar et al. and Huang. Applicants observe that the combined disclosures of Talwar et al. and Huang are defective for the reasons discussed above in the first obviousness rejection. That is, neither Talwar et al. nor Huang teach or suggest the claimed structures which include *a gate formed of a metal comprising Re vertically abutting said Hf-based gate dielectric, said gate comprising Re has an interface trapped charge density of about  $3 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$  to about  $4 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$ , and wherein said Re is derived from a  $\text{Re}_2(\text{CO})_{10}$  CVD precursor.*

In view of the above remarks, the second and third obviousness rejections raised in the outstanding Office Action have been obviated. Reconsideration and withdrawal thereof are respectfully requested.

The various § 103 rejections also fail because there is no motivation in the applied references which suggest modifying the disclosed structures to include the various elements, as presently recited in the claims of the present application. Thus, there is no motivation provided in the applied references, or otherwise of record, to make the modification mentioned above.

"The mere fact that the prior art may be modified in the manner suggested by the Examiner does

not make the modification obvious unless the prior art suggested the desirability of the modification." In re Vaeck, 947 F.2d, 488, 493, 20 USPQ 2d. 1438, 1442 (Fed.Cir. 1991).

The rejections under 35 U.S.C. § 103 have been obviated; therefore reconsideration and withdrawal thereof are respectfully requested.

Thus, in view of the foregoing amendments and remarks, it is firmly believed that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'LS Szivos', with a long horizontal flourish extending to the right.

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